Claims

What is claimed is:

1. A method of generating a number within a random sequence of numbers using an

5   imaging device comprising an integrated circuit, the integrated circuit having a plurality

of imaging sensors in a known arrangement for sensing an image provided thereto and for

providing an output signal indicative of the sensed image, wherein the output signal

comprises a plurality of pixel values each relating to an imaging sensor from the plurality

of imaging sensors, each pixel value of the plurality of pixel values relating to one pixel

10   within the sensed image at a known location dependent upon the location of the related

image sensor, the method comprising the steps of:

sensing, with a first imaging sensor of the plurality of imaging sensors, a first signal to

provide first sensed data, wherein at least a portion of the first sensed data comprises

noise presented to or from within the device;

15   sensing, with a second imaging sensor of the plurality of imaging sensors, a second signal

to provide second sensed data, wherein at least a portion of the second sensed data

comprises noise presented to or from within the device;

determining a noise based value from the noise portion within each of the first sensed

data and the second sensed data; and,

20   based on the noise based value providing the number within the random sequence of

numbers.

2. A method of generating a number within a random sequence of numbers as defined in

claim 1, comprising the step of:

25   comparing the noise based value to a threshold value and providing a first binary value

when the noise based value is below the threshold value and a second different binary

value when the noise based value is above the threshold value.

3. A method of generating a number within a random sequence of numbers as defined in

30   claim 1, comprising the step of:

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removing higher order digits from the noise based value and retaining lower order digits within the noise based value to provide the number.

4. A method of generating a number within a random sequence of numbers as defined in claim 1, wherein the step of determining a first noise based value comprises the step of: subtracting a value derived from the first sensed data from a value derived from the second sensed data to provide a difference therebetween, wherein the difference is provided as the number within the random sequence of numbers.

5. A method of generating a number within a random sequence of numbers as defined in claim 1, comprising the steps of:
extracting a combined noise portion from the first sensed data and from the second sensed data; and,
sampling the combined noise portion to produce a sampled value,
wherein the number is determined in dependence upon the sampled value.

6. A method of generating a number within a random sequence of numbers as defined in claim 1, wherein the step of determining a first noise based value comprises the steps of:
determining a primary value based on the noise portion within the first sensed data;
determining a secondary value based on the noise portion within the second sensed data; and,
based on the primary value modifying the secondary value to provide the number.

7. A method of generating a number within a random sequence of numbers as defined in claim 6, wherein modifying the secondary value comprises adding an amount to the secondary value, the amount determined in dependence upon the primary value.

8. A method of generating a number within a random sequence of numbers as defined in claim 6, wherein modifying the secondary value comprises determining a range of values for the secondary value in dependence upon the primary value.

9. A method of generating a number within a random sequence of numbers using an imaging device comprising an integrated circuit, the integrated circuit having a plurality of imaging sensors in a known arrangement for sensing an image provided thereto and for providing an output signal indicative of the sensed image, wherein the output signal

5   comprises a plurality of pixel values each relating to an imaging sensor from the plurality of imaging sensors, each pixel value of the plurality of pixel values relating to one pixel within the sensed image at a known location dependent upon the related image sensor, the method comprising the steps of:

sensing with the plurality of imaging sensors an image provided to the device;

10   providing an output signal based on the sensed image; and,

In the absence of relevant image information at at least two imaging sensors of the plurality of imaging sensors:

sensing, with a first imaging sensor of the at least two imaging sensors, a first signal to provide first sensed data wherein at least a portion comprises noise

15   presented to or from within the device;

sensing, with a second imaging sensor of the at least two imaging sensors, a second signal to provide second sensed data wherein at least a portion comprises noise presented to or from within the device;

determining a noise based value from the noise portion within each of the first

20   sensed data and the second sensed data; and,

based on the noise based value providing the number within the random sequence of numbers.

10. A method of generating a number within a random sequence of numbers as defined in

25   claim 9, wherein the relevant image information comprises fingerprint image data and wherein the at least two imaging sensors of the plurality of imaging sensors are placed outside an area of the image typically covered by a fingerprint.

11. A method of generating a number within a random sequence of numbers using a

30   device comprising a plurality of sensing electrodes in a known arrangement, each sensing electrode being one of a pair of electrodes forming a capacitor, for sensing an image of an

object in contact with or in close proximity of the device, wherein the sensing electrodes

sense a change of capacitance induced by the object, and for providing an output signal

based on the sensed image, wherein the output signal comprises a plurality of pixel

values, each pixel value of the plurality of pixel values relating to one pixel at a known

5   location within the sensed image, the method comprising the steps of:

sensing, with a first sensing electrode of the plurality of sensing electrodes, a first signal

to provide first sensed data, wherein at least a portion comprises noise presented to or

from within the device;

sensing, with a second sensing electrode of the plurality of sensing electrodes, a second

10   signal to provide second sensed data, wherein at least a portion comprises noise presented

to or from within the device;

determining a noise based value from the noise portion within each of the first sensed

data and the second sensed data; and,

based on the noise based value providing the number within the random sequence of

15   numbers.

12. An imaging device used for generating a number within a random sequence of

numbers comprising:

a transparent layer for transmitting impinging light in dependence upon an image

20   provided to the imaging device;

a plurality of imaging sensors in a known arrangement within a single integrated circuit

for sensing the transmitted light and for providing an output signal based on the sensed

image, wherein the output signal comprises a plurality of pixel values, each pixel value of

the plurality of pixel values relating to one pixel at a known location within the sensed

25   image, and wherein at least a portion of the signal comprises white noise presented to or

from within the imaging device; and,

a processor for receiving the signals from at least two imaging sensors of the imaging

sensor array and for determining a value based on the portions of the signals comprising

white noise.

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13. An imaging device used for generating a random number as defined in claim 12, wherein the processor is for receiving the signals and for selectively determining at least two values based on a noise portion of each of the signals and wherein the random number is generated in dependence upon the two values.

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14. An imaging device used for generating a random number as defined in claim 12, wherein the imaging device comprises a CCD array for sensing an image and for providing a signal including pixel values for pixels of the sensed image in each of a plurality of rows and columns.

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15. An imaging device used for generating a random number as defined in claim 12, wherein the imaging device comprises a CMOS imaging device.

16. A device for generating a random number as defined in claim 14, comprising:

15   a prism including a platen for accepting a fingerprint;

a light source for directing light toward the platen, a portion of the light reflecting off the platen along an optical path,

wherein the charge coupled device array is disposed within the optical path to provide signals in dependence upon light within the optical path incident thereon.

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17. A device for generating a random number as defined in claim 16, comprising a cover for the platen, said cover for rendering the platen substantially reflective.

18. A device used for generating a number within a random sequence of numbers

25   comprising:

a plurality of sensing electrodes in a known arrangement, each sensing electrode being one of a pair of electrodes forming a capacitor, for sensing an image of an object in contact with or in close proximity of the device by sensing a change of capacitance induced by the object and for providing an output signal based on the sensed image,

30   wherein the output signal comprises a plurality of pixel values, each pixel value of the

plurality of pixel values relating to one pixel at a known location within the sensed image; and,

a processor for receiving the signals from at least two sensing electrodes of the array of sensing electrodes and for determining a value based on the portions of the signals

5 comprising white noise.

19. A device for generating a random number as defined in claim 18, wherein the plurality of sensing electrodes is arranged in a plurality of rows and a plurality of columns each row being related to a row in the sensed image and each column being

10 related to column in the sensed image.

20. A device for generating a random number as defined in claim 19, wherein the plurality of sensing electrodes is a touchpad.

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